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CARNIVOROUS PLANT NEWSLETTER

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Front Cover: *Utricularia stygia*, Plumas Co., California, USA, green shoot with traps, inflorescence (one corolla detached). See article on page 113.

Back Cover: *Sarracenia purpurea* subsp. *venosa* var. *montana* in Georgia. See article on page 103.

Carnivorous Plant Newsletter is dedicated to spreading knowledge and news related to carnivorous plants. Reader contributions are essential for this mission to be successful. Do not hesitate to contact the editors with information about your plants, conservation projects, field trips, or noteworthy events. Contributors should review the "Instructions to Authors" printed in the March issue of each year. Advertisers should contact the editors. Views expressed in this publication are those of the authors, not the editorial staff.

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<i>D. glanduligera</i>	<i>S. purpurea</i> subsp. <i>purpurea</i>
<i>D. indica</i> —NSW, Australia	<i>Utricularia multifida</i>

This is a partial list of the seeds available. A complete list is online at the ICPS web site, <http://www.carnivorousplants.org/> or by sending a self-addressed, stamped (if USA), envelope to the seed bank address.

Seed packets are US\$1 each. Please include US\$3 postage and handling for each order. You may pay by cash, check, or money order in US\$. Many members pay with cash. Please make checks and money orders payable to "ICPS Seed Bank".

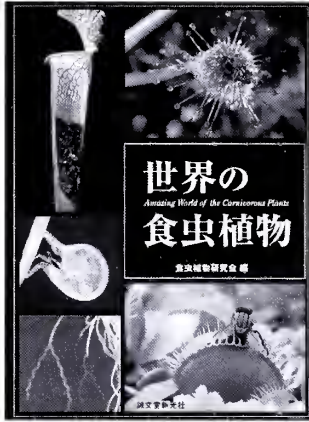
The seed bank is a members-only benefit. The quantity of seed available to each member is 1 packet of each variety per month and 40 packets total in any 12 month period. Please list alternative seed selections, as other orders will arrive before yours. If you have an e-mail address, please include it so we can correspond should any issues arise. Seeds purchased through the seed bank are intended for your personal use only and may not be sold.

You are encouraged to stock the seed bank with seed produced by cultivated plants. The ICPS policy on wild seed collection is on line at the ICPS web site. Cultivation-produced seeds of species protected by the US Endangered Species Act are distributed within the US only, and in accordance with the ICPS's US Fish & Wildlife Service permit.

Donate seed and get credit for free seed from the seed bank. Seeds of selected varieties are available free to teachers for use in the classroom and to scientists and conservation organizations. It is ICPS policy not to sell internationally seed of plants protected by CITES Appendix I or the US Endangered Species Act.

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BOOK REVIEW



Insectivorous Plant Society. 2003. *Carnivorous Plants of the World: Amazing World of the Carnivorous Plants*. ISBN 4-416-40305-4 160 p., approximately 700 color photographs, figures and maps. Paperback, 19 × 26 cm (7.5 × 10 in), US\$40.00-US\$60.00, depending upon purchase and shipping method.

Reviewed by Barry Rice

The Insectivorous Plant Society (Japan) has a fine history of publishing lovely books on carnivorous plants, and this new book follows the tradition. This volume is essentially a large album of photographs, showcasing hundreds of images taken by twenty-three photographers. (On his web site, Makoto Honda estimates the book contains 700 photographs of approximately 350 species!) The great majority of the photographs are extremely high quality. There are even photographs of such oddities as *Ibicella* or *Paepalanthus*, which while not carnivorous by everyone's criteria are still interesting to learn about. The photographs are neatly grouped by genus, but the ordering of the photographs within each genus baffles me. Fortunately, a species index with page references is provided near the end of the book.

While I cannot read Japanese, all of the images are clearly labeled with Latin names, so the plants are easily recognized. There is also a long section at the end of the book with English language comments.

The only criticism I have of the book is that some of the names given for the plants are not valid. For example, *Utricularia capensis* is a synonym of *Utricularia bisquamata*, and a large number of plants are identified with invalid, unregistered cultivar names such as *Nepenthes* 'Fushimi', *Pinguicula primniflora* 'Rose', *Nepenthes* 'Dyeriana' (this latter plant should be referred to as *Nepenthes* × *dyeriana*), etc. Perhaps the new cultivar names will be registered in the future?

You can purchase this book via Japanese Amazon (<http://www.amazon.co.jp>). Those who do not read Japanese would probably be wiser to purchase the book through Makoto Honda, who has graciously agreed to act as a reseller of this book. His web site is <http://www.honda-e.com>. The source you choose for buying the book, as well as shipping options, will determine the cost of the book. (Note the large range in price I provided above.) If these details are not current, look to the IPS web site (<http://www2.odn.ne.jp/~chr79360>) for more current information.

I understand that the publisher, fiscally wary, did not print very many copies of this book. If this is the case, perhaps the publisher will be encouraged to print another edition when the current edition sells out. This book is nice enough that I am sure it will sell out, incidentally, so act quickly if you wish to have a copy for yourself.

Forget anything?

If you need to renew your ICPS membership, do it this week, do it today. The year that your membership in the International Carnivorous Plant Society expires should be printed on the mailing label for your issue of *Carnivorous Plant Newsletter*. If it reads 2003, you must renew your membership. Timely renewal by our members saves us money that could be spent printing more color illustrations in *Carnivorous Plant Newsletter*, conserving wild carnivorous plant populations, or devising other ways to help serve the ICPS membership better.

THREE *UTRICULARIA* SPECIES WORTHY OF CULTIVATION

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Keywords: cultivation: *Utricularia flaccida*, *Utricularia tridentata*, *Utricularia welwitschii*.

The genus *Utricularia* offers more species, with more variety in form and habitat, than any other genus of carnivorous plant, yet in the vast majority of collections it is represented by only a few commonly available species. Granted, there are some species that can be quite difficult to cultivate, or that are frustratingly shy flowerers. However; there are many more species that are easy to grow and flower that are completely unknown to most growers. Below, I will describe a few species appropriate for growers of all skill levels, the cultivation of which has so far been overlooked by the carnivorous plant literature.

Utricularia flaccida. This species is a particular favourite of mine for its large flowers and vigorous growth. The inflorescence often reaches 30-50 cm in height, with six or more flowers per scape. The flowers are bright yellow, with a touch of red on the palate, and are about 2 cm across. The leaves have an interesting branching shape, which is especially apparent if the plant is grown submerged.

Utricularia welwitschii. When not in flower, *U. welwitschii* is a fine example of why people often overlook this genus—the tiny leaves are a shade of reddish green that blends in almost perfectly with the substrate. The compelling feature of this plant is the wiry scapes which will twine tightly around a support. Often many inflorescences will be present at the same time and these may twine around each other to form a braided rope. The flowers themselves are small but nicely coloured. According to Taylor (1989) not all specimens of this plant exhibit this behaviour, although I think that most clones of this plant in cultivation have this twining trait.

Utricularia tridentata. Although lacking great size or amusing habits this plant is worth growing for the subtle beauty of its flowers (see Figure 1). The well-proportioned bright mauve



Figure 1: *Utricularia tridentata*.

flowers with yellow and white markings on the palate may only be a centimetre across, but they remind one of a scaled-down version of one of the larger Central and South American *Utricularia* species. This plant is often erroneously identified in people's collections, for no good reason, as "*U. steyermarkii*" (Although *Utricularia steyermarkii* is an actual species of *Utricularia* from South America, it is quite different in both flower colour and leaf form.)

None of these species require any special treatment, and are all as easy to grow as *U. sandersonii* or *U. livida*. They will grow vigorously in a warm terrarium, can be planted in a standard mixture of peat and sand, and watered on the tray system. I would encourage all carnivorous plant growers to give them a try.

References:

Taylor, P. 1989, The genus *Utricularia* - a taxonomic monograph, Kew Bull. Add. Ser. 14: 1-724.



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A *SARRACENIA PURPUREA* VAR. *MONTANA*
CONSERVATION PROJECT

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Keywords: conservation: Georgia (USA), *Sarracenia purpurea*.

Introduction

A few weeks before the end of 2001 I had the pleasure of taking a jolting car ride deep into the wild mountainous forests of northern Georgia. My driver was Ron Determann (from Atlanta Botanical Garden, hereafter ABG), and our goal was to visit the only site in Georgia where still occurred the rare mountain pitcher plant *Sarracenia purpurea* var. *montana*.

Having been told I am an eccentric, I feel well qualified to note that Ron is one too. Here is a fellow who on all hikes brings a sharpened machete that never stops singing through the air, clearing passages through tangled woody vegetation. It is also effective at intimidating obstreperous back woods “good old boys” who otherwise might think that a lone Dutch botanist in rubber boots was easy prey. Ron drives a little white Subaru, the panels of which are mostly covered with huge custom graphics of *Sarracenia oreophila*, *S. leucophylla*, and *Dionaea muscipula*. Flame decals around the wheels pack added punch. Ron is a plant nerd with attitude!

On the day of our trip, it rained only once—from sunrise to sunset. (A joke stolen from my coeditor, Jan Schlauer.) We left Atlanta in the morning and followed a winding road northbound into the Appalachian Mountains. Our first stop was at a small cafe for a quick meal, and I took this opportunity to shake off the queasy, car-sick stomach I had already developed. We ordered meals (listed on the menu as “omlets”), and Ron related the history of the location we were to visit.

Years ago, the site was primarily being stewarded by someone who unfortunately did not know a great deal about *Sarracenia* (there is no reason to name names or point fingers...). This steward had learned that *Sarracenia* plants were carnivorous in order to survive in nutrient-poor habitats. Acting on kindness, this well-intentioned but only partly-informed person lugged a bag of fertilizer concentrate to the site, and fed each plant, pitcher by pitcher! The unfortunate result, of course, was nearly 100% mortality of the *Sarracenia*. After ABG was contacted in a panic, Ron visited the site and found only seventeen surviving plants—all the other *Sarracenia* were dead. Another ominous factor that Ron observed was that the size of the suitable habitat was very small—it consisted of only a single bog clearing embedded in a densely wooded, soggy forest. However, even though the situation was critical, seventeen plants were better than none at all.

As Ron surveyed the densely wooded hollow he noticed that the encroaching shrubs and trees were primarily native species that invade when fire is suppressed by humans. Ron tried to picture what the area might have looked like a few decades ago when fire was still a part of the landscape, and he imagined a network of bog openings all populated with sun-loving species, including *Sarracenia purpurea* var. *montana*. But he realized that after humans started preventing the spread of the occasional natural wildfire, all these bog openings were invaded by woody species and were eventually transformed into boggy forest copses. The sun-loving *Sarracenia* and other herbaceous bog species perished; only one clearing remained. This was all that was left—one shrinking sunny patch housing only seventeen pitcher plants.

It was an emergency situation, but Ron realized that a well planned restoration program could do more than just repair this one little clearing—with enough resources, he might be able

to transform the wooded site back into a network of interconnected bog openings filled with a diversity of bog plants. And there was no time like the present to do it, because this was the last site for *Sarracenia purpurea* var. *montana* in all of Georgia!

His tale completed and our “omlets” consumed, Ron and I returned to our journey. The road wound ever more severely. The pavement gave way to gravel, and the gravel gave way to oak and slippery bedrock. If you would like to see what the dense, wet, foggy forest (primarily oak, hickory, pine, and rhododendron) looked like, view the film “Deliverance”—Ron informed me that it was filmed only a few kilometers away. I thought about the characters portrayed in the film, and was happy that Ron had his machete.

Eventually even our barely passable road became impassable, so we parked and continued on foot. After a few wrong turns, we found the thick growth of trees and shrubs that marked the edge of the bog. (Ron pointed his machete at a few trees that were carved high on their trunks with deep furrows from bears sharpening their claws. I think this might be a way for bears to mark their territories. Perhaps it was to intimidate visitors—this bear-message certainly resonated with me.)

Pushing, grunting, and forcing our way through the trees, the long sought bog clearing was finally reached. As I stepped out of the wet trees and into the opening, I saw that all around was a carpet of *Sphagnum*, numerous other bog plants, and of course *Sarracenia purpurea* subsp. *venosa* var. *montana*. This was the first time I had ever seen the plant and I spent some time studying its interesting features. It has a number of consistent characters which separate it from *Sarracenia purpurea* subsp. *venosa* var. *venosa* (which is found on the Atlantic coastal plain), or *Sarracenia purpurea* subsp. *venosa* var. *burkii* (of the Gulf Coast). The pitcher hood is not as large, and the wings of the hood tend to be folded towards closure so their edges are nearly touching, almost as if the plant was jealously guarding the contents of its pitchers. The hairs on the inner hood surface are also in general shorter, only 0.8-1.0 mm long. Finally, the red venation is particularly bold, coarse, and bright. There was very little red pigmentation between the veins. Altogether, it is a beautiful plant (see Back Cover).

This first bog clearing was only about 15 meters in diameter, and was the one that had the original seventeen plants. Ron then trekked us through the wet foliage and squelchy mud to highlight the work his team had been doing in an effort to return more of the hollow to its original conditions.

Ron explained his restoration technique. He first explores the soil under the densely crowded trees, looking for old peat moss deposits. (Once again his machete comes in handy, slicing into, and exposing chunks of soil.) When he finds relic peat moss, he knows the area was at one time a bog clearing. He and his team hack down the trees and shrubs to make an opening, then heap the cut wood into the center of the clearing where it rapidly rots away. Then, Ron seeds the clearing with sprigs of *Sphagnum* from the original bog, and the *Sphagnum* quickly forms a carpet. Within just a few years, this protocol transforms the closed forest canopy into a bog clearing ready for seedling *Sarracenia* and other bog plants.

I asked Ron where he obtained his seedling *Sarracenia*. He told me that he harvests seed from the original clearing, and brings them to ABG. There his team germinates the seed, grows them for a year or two, and then returns the seedlings to the site. This period of babying at ABG gives the seedlings a better chance of survival in the bog, and ensures they do not just become overwhelmed by the *Sphagnum*. I was pleased to hear that he did not produce seed off-site (i.e. by pollinating plants grown at ABG) because such a practice might distort the genetic composition of the plants in this natural setting. (Just as growing plants for several generations in cultivation tends to select a plant more fit for artificial conditions, the same effect tends to produce a plant which is less fit for wild conditions.)

The proof of his method's efficacy is in the pudding, and this bogland restoration work's success was manifest. Where once only seventeen plants were originally found, hundreds of *Sarracenia* now thrived. I even noticed seedling pitcher plants germinating by themselves—the site was becoming viable and vigorous. Where there was once only one small clearing sur-



Figure 1: Ron Determann standing in a recently cleared bog opening. Notice the green developing carpet of *Sphagnum*. The invading trees were ringed to let in sunlight.



Figure 2: Ron Determann standing in a maturing bog opening filled with *Sarracenia*.

rounded by encroaching trees, there were now about four clearings in various stages of restoration.

As both the project area and the population of *Sarracenia* increase, the site will soon exit the critical stage. Once this happens, Ron expects that seed may even be in sufficient abundance for special distribution via the ICPS seed bank, or a rare plant distribution program as was previously administered by the ICPS (Rice, 2003). This would be most excellent!

Of course, one big problem in doing this kind of work is financial support. Ron was doing all this work on a shoestring. I was amazed to learn that in order to keep the ABG project continuing, Ron only needed about \$4000 over the next two years. The ICPS Conservation Program is helping fund this project at ABG, but we need your additional help¹. Please send your tax deductible donation to the ICPS Conservation Program. (Include the information requested in the boxed note below with your contribution.) While any donation is appreciated, a minimum of \$40 is recommended. This is a very inexpensive way to achieve meaningful conservation results. These donations will support basic operating funds, i.e. machetes, saws, gas money, planting materials, refreshments for volunteers, equipment for prescribed burns, fencing, and signage. It will help improve the existing bog openings, as well as clear more areas to improve the connectivity of these bog clearings.

ICPS Conservation Program Donation

Your name: _____

How would you like us to use your donation?

- ☐ *Sarracenia purpurea* var. *montana* conservation
☐ Any ICPS conservation program

Donation amount: _____

Paid as: ☐ Cash ☐ Check

Donations are tax deductible. Write checks to "ICPS Conservation".

At present, the individual sites are still so small that they are vulnerable to damage. One hunter gutting a deer and leaving the entrails to rot could severely damage even the most mature of the glades. There are also heady conservation challenges ahead—how should fire be reintroduced to the site, and what should be done about the trampling wildlife (such as those bears) which are attracted to the bog clearing? Heady challenges indeed, but with dedicated and experienced people like Ron and the ABG team working to restore this site, I have both high hopes and cautious confidence that with continued ICPS funding this Georgia bog will remain filled with *Sarracenia purpurea* subsp. *venosa* var. *montana*.

References:

Rice, B. A. 2003, *Sarracenia* Distribution Program, Carniv. Pl. Newslett., 32: 4-7.

¹Large national organization like The Nature Conservancy are putting more effort into "landscape scale" conservation areas, and are placing less emphasis on small sites like this *Sarracenia* bog. It is up to organizations like ABG or the ICPS which are regional or taxon-focused to do the small scale, but strongly focused and important work.

WETLAND PLANTS IN THE DESERT

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Keywords: observations: *Utricularia macrorhiza* — travelogue: Nevada (USA), *Utricularia macrorhiza*.

The mystery began several years ago when one of us (BR) was reviewing the collections of a small herbarium in southern Arizona. Dry, hot, desert land does not have many aquatic plants, so the discovery of a slender folder of *Utricularia* sheets was unexpected. When *Utricularia* plants are found in the southwestern USA they are almost always *U. macrorhiza*, growing in the mountains that rise high above the desert floor. But one of the specimens, a thirty year old sheet of fragments described as having been collected in Duckwater, Nevada, was puzzling. This unidentified specimen consisted of just two short, bushy branches, each only 5 cm long. It did not look like *U. macrorhiza*, and it certainly did not seem likely to have been collected in Duckwater. Duckwater is in Shoshone Indian Territory. It is scrub desert, dry and dusty, a land of sagebrush, not *Utricularia*.

The herbarium sheet invited questions. Was the specimen correctly labelled? Did this aquatic plant really live in the desert? And was the specimen really *U. macrorhiza*, somehow weirdly distorted? Unfortunately the collection site was remote, so these questions were long unanswered.

In the summer of 1998 we planned a trip that would take us near Duckwater Indian Reservation, and which would offer us the perfect opportunity to explore this mystery. In anticipation we did a little preparatory research. We checked topographical maps and found that a "Little Warm Spring", mentioned on the herbarium label, did exist on the reservation. We then called the Duckwater headquarters and explained that we were interested in exploring the area for evidence of this carnivorous plant. Headquarters verified the existence of the spring, but could offer no information as to the presence of the plant. However, they did grant us permission to search for it and to collect specimens.

Early on the morning of August 15 we left northern California and drove to just west of Ely, Nevada. We arrived late in the evening and decided to camp in the desert. The next morning we made our plans for the drive to Duckwater. We chose the road that was most clearly marked on the map, noting that it would take us through the town of Hamilton where we could stop for gas. It looked like a fairly straightforward 72 km (45 mile) drive. We expected that it would take us about forty minutes to get to the reservation.

Shortly after we set out, our straightforward plan developed kinks. The rocky terrain grew very rough. The road we had chosen rapidly degenerated into an unfriendly trail that wound its way through the White Pine Mountains. We bounced through notch canyons full of rubble that had rolled down the mountainsides. Cows wandered about on the trail. We passed the crumbling remains of long-abandoned dwellings and a deserted mine surrounded by mounds of tailings—all that remained of "Hamilton, Nevada". No gas for sale here! As if to mirror our confusion, the road divided into a network of paths that twisted through the desert mountains. Maps being useless, we navigated by compass. For long stretches, washouts and boulder piles forced us to a crawl. Vultures hovered overhead. After two and a half jolting hours we had traveled only 40 km (25 miles). Gradually, however, the road improved: it smoothed and flattened, and the horizon opened around us. We were able to sit back, see where we were and enjoy the rest of the drive to Duckwater Indian Reservation.

Duckwater is weird. It is an alkaline desert in the undrained basin between the Sierra



Figure 1: *Utricularia macrorhiza* habitat (foreground) on the arid Duckwater Reservation. Photo by E. Salvia.



Figure 2: Dense accumulations of *U. macrorhiza* draped over rocks. Photo by E. Salvia.

Nevada in California and the Wasatch Range in Utah. Perched at an elevation of 1700 m (5600 ft), its topography consists of flat valleys separated by frequent mountain ranges that reach to even greater heights. It is dry, dusty, and covered with alkaline-loving plants like rabbitbrush, four-wing saltbush, and mormon tea (*Chrysothamnus nauseosus*, *Atriplex canescens*, and *Ephedra* spp., respectively). This is unlikely habitat for an acid-loving aquatic species and so, although we had been assured that some kind of wetland awaited us, we were prepared for disappointment.

Much to our surprise the wetland did exist. Here in the middle of this scrub desert was a small explosion of lush greenness on a gently sloping hillside. We explored the area and found a few small ponds, but they were fouled by cattle and were useless for carnivorous plants. A quick stream (probably artificially channeled by ranchers) descended the hill, and near the ponds fanned into a broad sheet of water which flowed over the desert hardpan. (This stream presumably drains from the mountain ranges to the northeast.) Grasses and sedges grew densely everywhere. On hands and knees, we searched this water-saturated area carefully for bladderworts. No luck. Still, we did not give up, for the wet slopes were bright with yellow monkey flower (*Minulus* spp.), and this genus often occurs with *Utricularia*.

Further downhill, the sheeting water coalesced back into a braided network of fast-flowing streamlets, each only 45 cm (18 inches) wide and 30 cm (12 inches) deep, all interconnected by wet desert ground. In places the streamlets widened and became very shallow as they flowed over large flat rocks, then regrouped, narrowed and regained speed. "Little Warm Spring" was not a spring, so much as a complex of streams and seeps.

This area was remarkable for the way the wetland abruptly became desert—a hand's width spanned the change from green, sedge wetland to brown, dry desert (Figure 1, see on p 108). At some parts of the wetland's boundaries the vegetation was bizarrely mummified with a thick encrustation of evaporated salts. Clearly, the water was extremely high in dissolved compounds. (We measured the pH to be approximately 7.) This did not presage success for our *Utricularia* search.

After several hopeful starts, we were running out of places to look. We were confident that our *Utricularia*, whatever species it was, would prefer quiet, motionless waters, but we had searched the few bodies of still water with no luck. We had even searched the places where the water flowed swiftly through the grasses, hoping to find plants that had been washed out of some pond that eluded us—still, no luck. Finally, out of desperation, we started searching the rapidly flowing streams. Much to our surprise, there in the fast moving water we found it: fat, sassy *Utricularia*!

Once we revised our idea of where to look, finding plants was easy! The plants grew thickly all along the edges of the streamlets, tumbling and waving in the water. Where the streamlets widened and became shallow the *Utricularia* draped over the large rocks (Figure 2, see on p 108). It was plentiful, vigorous and thriving. The plants were plump, with densely packed leaves that branched frequently. The stolons were thick and sturdy. The bladders were transparent and while they were catching some material, it was not in large quantities. We wondered if the traps were being triggered by the action of the streams, but when we pulled the plants from the water we could hear the traps discharging. There were no flowers, scapes or any indication of flowering parts. Even so, the plants seemed healthy, robust and happy with their environment.

After a few minutes of close inspection we were almost certain that these plants were *U. macrorhiza*. However, they differed from the *U. macrorhiza* we have seen at numerous other sites in the USA and Canada. They were not nearly as long (at most, 60 cm or 24 inches long), branched more frequently (Figure 3, see on p 110) and were an uncharacteristic bright, light green. The leaves were less feathery, more compact and sturdy, and the stolons were unusually brittle. *Utricularia macrorhiza* plants usually have traps that are blackish or reddish, but these plants had transparent, light green bladders. We thought at first that these peculiar features might have been a response to living in a rapidly flowing, riparian situation. However, these characteristics were exhibited by all the plants we found, even the ones growing in fairly calm areas.

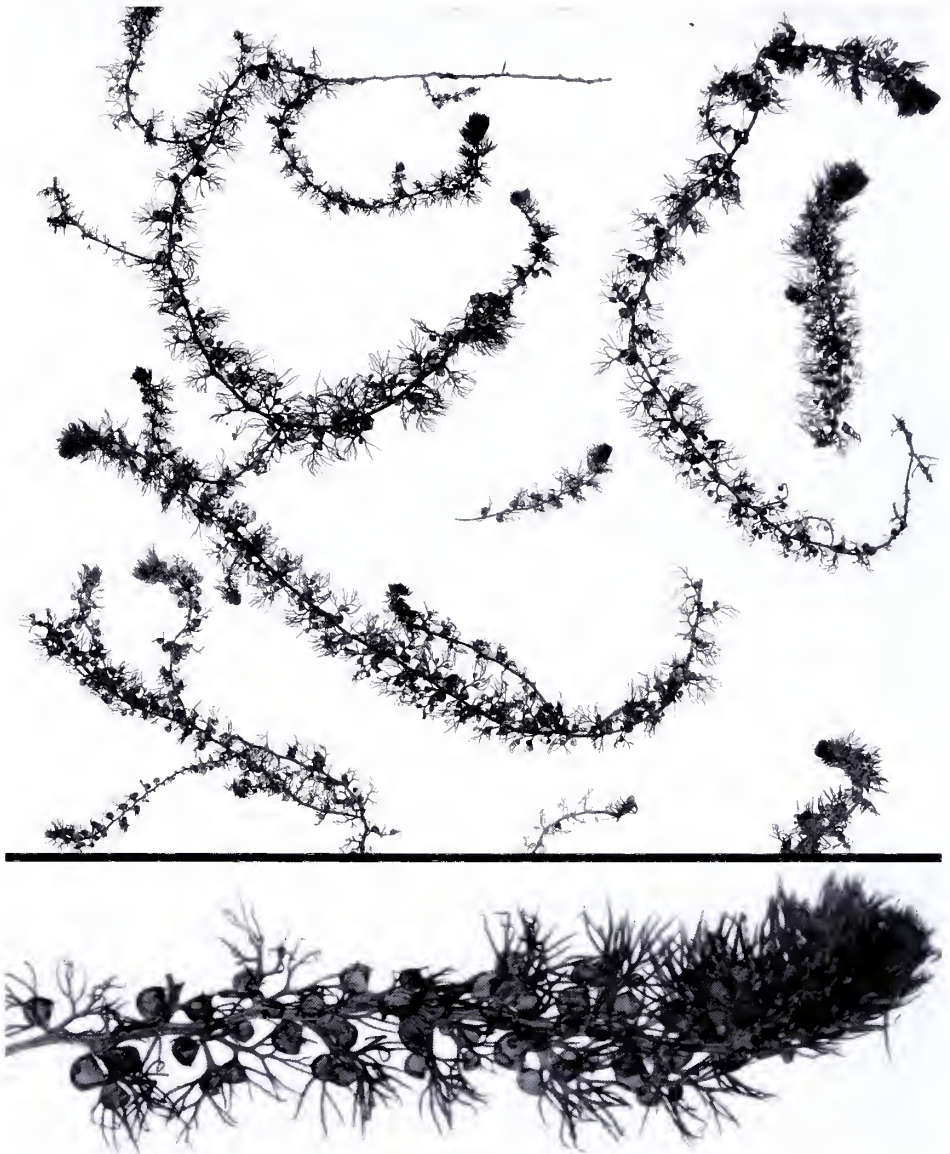


Figure 3: Details of Duckwater *U. macrorhiza* herbarium specimen (DAV 138712). Figure prepared by B. Rice.

such, we believe the peculiar features of the Duckwater plants are either genetically fixed or are a response to the obviously high concentration of dissolved salts in the water.

We took numerous photographs of this amazing site, and then collected and pressed herbarium specimens. Upon returning to California we studied their quadrifid glands—tiny organs inside the *Utricularia* bladders. While the overall form of *Utricularia* can be dramatically modified by environmental effects, the quadrifid glands are much more stable, and can be used to reliably identify many species. Under a microscope, we saw that the quadrifid glands were those of *U. macrorhiza*. This convinced us: the strange Duckwater plants were a peculiar variant of *Utricularia macrorhiza*. We mounted the specimens and deposited them at the Davis Herbaria (California) where skeptics may come, one and all, to be thrilled by the sight of wetland plants from the desert.

Despite the quite conventional results of our expedition (another *Utricularia macrorhiza* site), we still marvel at the peculiarities of the Duckwater habitat. Not only has this acid-loving plant found a way to survive in the alkaline Great Basin Desert, but this species, which is usually restricted to ponds and lakes, has found a way to survive in a rapidly flowing stream. Not bad for a boring old *Utricularia*!

Acknowledgements

The authors would like to thank the Shoshone people at Duckwater for granting us permission to botanize on their land.



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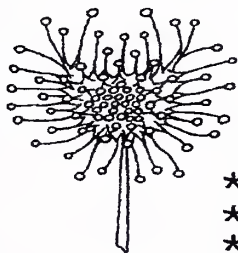
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BOOK REVIEW



Clarke, Charles. 2002. *A Guide to the Pitcher Plants of Peninsular Malaysia*. Natural History Publications, Borneo. ISBN 983-812-061-8. 38 p., approximately 68 color photographs, figures and maps. Paperback, 18 × 25 cm (7 × 10 in), US\$6.00, shipping extra.

Reviewed by Barry Rice

Charles Clarke has produced yet another nice book about *Nepenthes*, this time a regional guide to the species and hybrids found in peninsular Malaysia.

Unlike his two large books (which are treatises on taxonomy, ecology, conservation, etc.), this book is more of a guidebook useful for a person visiting Malaysia. In fact, in format it is exactly the same as his other regional guidebook, "A Guide to the Pitcher

Plants of Sabah" (see the review in CPN 32:1, p.10.).

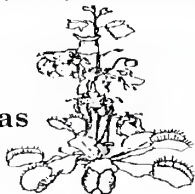
The first several pages consist of the usual brief review of carnivorous plants, as expected for a book that might be introducing the reader to the subject. But the meat of the book (about 20 pages worth) is the set of excellent discussions of each of the sixteen *Nepenthes* (ten species and six hybrids) currently known in peninsular Malaysia. After this section, there are a few pages describing where these species might be most likely found. (This information is given only in general terms—do not expect road names or GPS readings!)

As usual for one of Clarke's books, the text is concise, well written and accurate. But overshadowing the text is the photography, which is truly beautiful as well as illustrative of the essential characters of each species and hybrid. Clarke's composition and use of depth of field is masterful. Some of these photographs appeared in his previous books, but many others are new. If you are itching to have as many *Nepenthes* photographs as possible (which can be handy for polymorphic species), you should buy this book. (Incidentally, one of my photographs of *Dionaea muscipula* appears in this book, and as a result I am cited as a contributor, but I do not receive financial compensation for its use or this book's sales.)

Interested buyers should contact the publishers at Natural History Publications, A913, 9th Floor, Phase 1, Wisma Merdeka, P. O. Box 15566, 88864 Kota Kinabalu, Sabah, Malaysia. Their web site is <http://www.nhpborneo.com>. (This web site is an excellent source for related books, by the way.)

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UTRICULARIA STYGIA IN CALIFORNIA, USA, AND *U. OCHROLEUCA* AT ITS SOUTHERN RANGE

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What is *Utricularia stygia*?

Utricularia intermedia Hayne (1800) and *U. minor* L. (1753) are small, rootless, aquatic or semi-aquatic plants that are deeply anchored by colourless underground shoots with reduced leaves and numerous well developed traps. They have huge circumboreal distributions in the northern hemisphere (Hultén, 1986) and can easily be recognized.

However, plants can be found that show intermediate traits and are clearly distinct. These plants were first described as *U. ochroleuca* Hartman (1857)¹. A great deal of literature is devoted to establishing this name and discussing the identity and distribution of this widespread but rare species (e.g. Ascherson, 1886; Celakovsky, 1886, 1887; Glück, 1902, 1913; Casper, 1974). A hybridogenic origin was postulated by L.M. Neuman in 1900 (i.e. that *Utricularia ochroleuca* = *U. intermedia* × *minor*), but no experimental evidence (e.g. controlled hybridisation) was presented, because the species rarely flowers.

More recently, *Utricularia ochroleuca* s. lat. was split into two species by Thor (1987, validly in 1988): A new species, *Utricularia stygia*, and a more exactly defined *Utricularia ochroleuca* s. str.², *Utricularia stygia* can be distinguished from *U. ochroleuca* s. str. by the darker yellow, larger, almost flat lower lip and a slightly larger number of teeth with bristles on each leaf segment. In contrast, *Utricularia ochroleuca* s. str. has paler, smaller flowers with a lower lip which is at first almost flat but that later becomes deflexed at the margins (Thor, 1988). Thor gave clear instructions on how to identify the six Nordic species³ using two keys. One is based on the leaves, leaf segments and flowers and the other on the four-armed quadrifid glands inside the traps (see Table 1, page 114).

As flowers are rare, the best way to identify the species is indeed to look for traps on the green leaves and to check the teeth and tips of the ultimate segments of the green leaf and the

¹*Utricularia bremii* Heer is closely related to *U. minor* and not considered here. However this taxon should be remembered when dealing with robust variations of *U. minor* or *U. ochroleuca*. The quadrifid gland arm angles for *U. bremii* are approximately S=190° L=20° (cf. Taylor, 1989).

²Botanists indicate the older, more inclusive concept of the species by writing *Utricularia ochroleuca* sensu lato, which means "in the broad sense" and which is abbreviated "s. lat." The more restrictive definition (which must include the type collection) is indicated by *Utricularia ochroleuca* sensu stricto, or "s. str." which means "in the strict sense." Only plants clearly in accordance with the description given by Thor (1988) are labeled s. str. here.

³Including *U. australis* and *U. vulgaris*, but excluding *U. bremii*. The latter is not known from Scandinavia (Thor, 1979), but was collected in Karelya, Russia (62°N, 35°E, Adamec, pers. comm. 2002).

quadrifids inside the trap with a microscope. The morphological differences (length and angle⁻¹ of spur, size of shoots, number of teeth, number⁻¹ of traps on green leaves, quadrifid angle⁻¹ between short arms) may be ordered like this: *Utricularia intermedia* > *U. stygia* > *U. ochroleuca* > *U. minor*. The leaf segments of *U. intermedia* are typically obtuse and bear 5-12 bristles on minute teeth. *Utricularia stygia* (with 2-7 bristles) and *U. ochroleuca* s. str. (with 0-5 bristles) have fewer better developed teeth along the margins and acute leaf tips. *Utricularia minor* has one small bristle on the tip of each terminal leaf segment only.

	Angle S (in degrees)	Angle L (in degrees)	Teeth Number
<i>U. intermedia</i>	13 ± 8	8 ± 4	7.8 ± 1.6
<i>U. stygia</i>	74 ± 22	41 ± 15	4.7 ± 1.4
<i>U. ochroleuca</i> s. str.	171 ± 25	35 ± 17	2.2 ± 1.2
<i>U. minor</i>	271 ± 28	25 ± 11	0

Table 1: Statistic evaluation of the quadrifid glands and teeth of the ultimate leaf segments as given by Thor (1988). Angle S is the angle between the shorter pair of quadrifid glands arms, angle L is between the longer pair of quadrifid gland arms. Errors given as 1 standard deviation. A deviation of three standard deviations is significant.

The turions also have useful diagnostic characters. The hair density of the turions (see Figure 6) varies between species—the turions of *U. intermedia* are extremely furry (whitish when dry), while the turions of *U. minor* are bald except for very small terminal bristles. During the breaking of dormancy *U. intermedia* starts growing while the shape of the turion remains unchanged. The axes of the other species' turions become prolonged 3-5 times during this phase.

The observation of the small internal quadrifid glands requires the use of a microscope with about 150× magnification. Fresh, transparent, but mature traps are easiest to use, but traps preserved in spirits or dried without being pressed can also be used with reliable results. For this study the glands were studied with a microscope and photographed using a digital camera for computer evaluation (see Figures 1, 2, 3). For each species, 2-10 traps were opened to observe the internal glands, and 20-100 leaf segments were studied on 2-20 plants.

Variability

Thor's investigation was focused on Scandinavian material and he chose the most common type of *U. ochroleuca* s. str. in Scandinavia for his description and statistics (see Figure 1). He mentions that the type specimen of *U. ochroleuca* s. str. (from Hälsingland, Sweden) and most

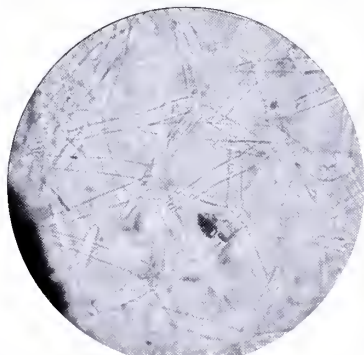


Figure 1: Quadrifid glands of *Utricularia ochroleuca* s. str., Itä-Uusima, Finland.

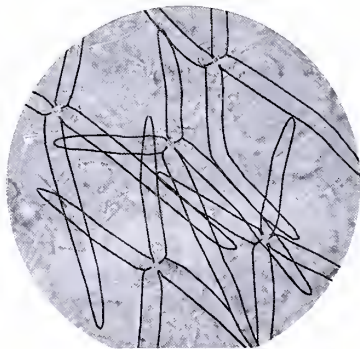


Figure 2: *Utricularia ochroleuca* s. lat., Trebon, Czechia. Some glands have been outlined to enhance visibility.

populations outside the Nordic countries have quadrifids with longer arms that are shorter and the angle between the shorter arms is less.

Herbarium specimens from East Germany and living plants from South Czechia were investigated and, indeed, they have a higher number of teeth (3-4), and the angles between the gland arms (angle L: $31^{\circ} \pm 10^{\circ}$, angle S: $85^{\circ} \pm 26^{\circ}$, N=20) are intermediate between the values given by Thor (see Figure 2, on p 114) for *U. ochroleuca* s. str. and *U. stygia*. Thus the difference between the more southern populations of *U. ochroleuca* s. lat. and *U. stygia* (see Figure 3, see on p 116) is not as large as could be expected when applying Thor's criteria.

The flower structure is often the most reliable feature to use when identifying *Utricularia* species, but some details are difficult to analyze in pressed specimens and frequently only sterile material is available. Field studies based upon living plants in situ are important to confirm herbarium findings on the form and color of inflorescences.

Utricularia ochroleuca s. lat. in Oregon and California

Utricularia ochroleuca s. lat. has a wide distribution in North America, but is quite rare (Ceska & Bell, 1973; NatureServe, 2001; Rondeau, 2002). I visited populations in Plumas Co., California, USA and Lane Co., Oregon, USA in 2000 and flowering specimens were found. Data on a third population in Clackamas Co., Oregon, USA, were kindly provided by B. Rice⁴ and J.H. Rondeau.

Utricularia stygia, Plumas Co., California

Inflorescences of a plant similar to *Utricularia intermedia* were found within depressions of the floating meadows of a dystrophic lake (Willow Lake, 1650 m) in Plumas Co. late June 2000. These were distinctive because the peduncles were distinctly purplish and the spur of the corolla pointed downwards (see Front Cover). They were growing with *Utricularia minor*, *Sphagnum* spp., *Menyanthes trifoliata*, *Drosera anglica*, and in association with *Carex* spp., *Eriophorum* spp., *Scheuchzeria palustris*, *D. rotundifolia* and *D. x obovata* (see Figure 5). These plants were also found alongside *U. intermedia* at this site the year before by Rice and are similar to those found by Rondeau at the nearby Lake Almanor (1410 m) in 1994. Plants from both Willow Lake and Lake Almanor were regarded by both Rondeau and Rice as being *U. ochroleuca* s. lat.

The specimens from Willow Lake had purplish peduncles, that are 11.5-14.0 cm tall and bore 1-3 pale yellow flowers on straight, rather long (11 mm) pedicels. The lower corolla lip was 9 mm long and 11 mm wide, with margins distinctively curved upwards. The spur was rather long (5-6 mm) and narrow. It was pointed downwards at 15-25°. Rice examined nine plants from two of his herbarium sheets. Rhizoids were observed only at the base of one out of 6 inflorescences, while all had colourless shoots⁴. The plants were robust and single traps were found on every first to fifth green leaf. (Sometimes no traps were found on the green leaves⁴). Single (or paired) bristles were found on typically 4-7 small teeth along the margins of each ultimate leaf segment. The angle between the longer arms (61 µm) of the quadrifids was approximately 42°, between the shorter arms (50 µm) it was approximately 77° (see also Figure 1 in Rondeau, 2002).

Despite the determinations that the Californian specimens are *U. ochroleuca* s. lat., it is apparent they are best evaluated as being specimens of *U. stygia*. Even though the flowers were not dark yellow with reddish tinge, but pale yellow with reddish stripes on palate and spur, the upwards curved corolla margins in combination with the orientation of the spur (approximately 20°, an "acute angle" is also found in drawings by Thor (1988)) are characteristic for this species. The size of the plants, the number of bristles, and the orientation of the arms of the quadrifid glands are typical for *U. stygia*.

⁴Rice provided data and observations based on plants collected by him and deposited at DAV.

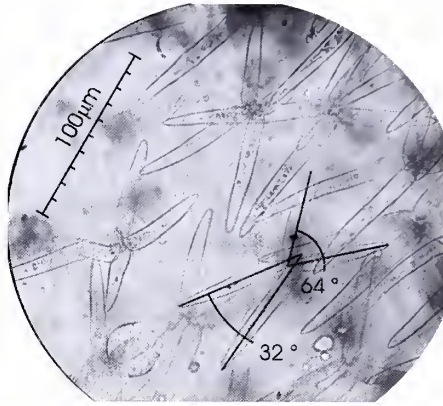


Figure 3: *Utricularia stygia*, Black Forest, Germany. One example on how the angles and lengths of the gland arms were measured is shown. In this example, $S=64^{\circ}$, $L=32^{\circ}$.

Utricularia ochroleuca s. lat., Lane Co., Oregon

Plants from this population were first collected here by Ingram, in 1926 (Ceska, 1973). In late June 2000, I found plants flowering frequently in seepages above the water table of the large fen along with *Drosera anglica* and *D. rotundifolia*. It lived in the open, water saturated hollows between the brown moss vegetation. In deeper water farther inside the fen *U. ochroleuca* s. lat. was replaced by *U. intermedia*. This suggests ecological niche partitioning for these two species (cf. Hoffmann, 2001; Adamec *et al.*, 2002).

This population was very unusual in lacking red pigments. Thus the peduncles (8-9 cm) were all green without any purplish coloration, even at the base. Usually two flowers were produced per inflorescence, on long 8-11 mm pedicels. The corolla was all light yellow with no red or brown markings. The lower lip was almost flat or had slightly deflexed margins. The spur was 3-4 mm long and distinctively curved and pointed downwards at approximately 40° relative to the lower lip (see Figure 4, see on p 117). Overall this was a small plant and the green leaves bore 0-2 traps. 2-5 bristles were found on sometimes prominent, curved teeth along the segment margins. Few, somewhat intermediate quadrifid glands were seen (angle S: $92-132^{\circ}$).

The corolla margins are deflexed which is characteristic for *U. ochroleuca* s. str. However, the plants differ from the description of *U. ochroleuca* s. str. given by Thor (1988): The large number of bristles (2-5, not 1-3) and the relatively low quadrifid gland angle S resemble *U. stygia*. Remarkable, but not unique to any species, is the absence of red pigments, the curved spur (not straight), and the pedicels, that were almost twice as long (not 4-7 mm).

Utricularia ochroleuca s.lat., Clackamas Co., Oregon

This plant was first collected in the Mt. Hood area by Thomson in 1927 (Ceska, 1973). Rice kindly described sterile herbarium specimens (DAV, 6 plants) that he collected at 1160 m, May 25th 2001 (pers. comm. 2002). He also provided two photographs of inflorescences (see Figure 7; see also the back cover illustration in Rondeau, 2002). Only five inflorescences were observed. He reported plants with purplish stalks, each very short, only approximately 5 cm tall, and bearing 2-3 flowers. The photographs show corollas that are yellow with some red-brown streaking on the palate, and with slightly deflexed margins. The spur is directed downwards from the lower lip at approximately 75° . Rice examined his collection and reported that the internodes were 4-7(10) mm, with 1(2) traps per leaf node. Leaf tips were acute, and the number of teeth



Figure 4: *Utricularia intermedia* (left) and *U. ochroleuca* s. lat. (right), Lane Co., Oregon, USA, June 26, 2000.



Figure 5: *Utricularia stygia*, Plumas Co., California, USA, June 20, 2000.

was very regularly seven. The values of the quadrifid arm angles are reported to be unstable, often most consistent with *U. stygia* (Rice, pers. comm. 2002). The number of teeth on the leaf segments is unusual for *U. ochroleuca* s. str. and approaches the value for *U. intermedia*. However the flower form and color clearly match *U. ochroleuca* s. str.

Conclusions

Compared to *U. ochroleuca* s. str., *U. stygia* is common in Europe and possibly in North America, too. The specimens of *U. ochroleuca* s. lat. observed in this study are not quite uniform in appearance. While Thor chose a form of *U. ochroleuca* s. str. common in northern Europe for his description, the type specimen of *U. ochroleuca* s. str. used by Hartman, and the form that may occur more often elsewhere in Europe, are reported to typically have smaller values for the quadrifid angle S, and more teeth along the margins of the terminal leaf segments. Thus it is less different from *U. stygia* and the casual observation of a few quadrifids is not foolproof.

Herbarium specimen and living plants, some of them in cultivation, from Germany, France, Czechia, Poland, Finland, Norway, and the USA were investigated and are presented in Table 2 for comparison.

The population of *U. ochroleuca* s. lat. from Plumas Co., California, can be identified as *U.*

		Angle S (in degrees)	Angle L (in degrees)	Teeth Number
1	<i>U. stygia</i> ¹	58	37	5 (3-6)
2	<i>U. stygia</i> ²	45	21	6 (4-8)
3	<i>U. stygia</i> ³	86 ± 26	44 ± 13	4.5 ± 1.2 (4-7)
4	<i>U. ochroleuca</i> s. lat. ⁴	85 ± 26	31 ± 10	3 ± 1 (2-5)
5	<i>U. ochroleuca</i> s. lat. ⁵	104 ± 20	34 ± 9	2 ± 1 (0-4)
6	<i>U. ochroleuca</i> s. lat. ⁶	140 ± 26	44 ± 10	4 ± 1 (2-5)
7	<i>U. ochroleuca</i> s. str. ⁷	155 ± 13	28 ± 4	1 (0-1)

¹From the Black Forest, Germany

⁵From Lane Co., Oregon, USA

²From Hordalandet, Norway

⁶From Park Co., Colorado, USA

³From Plumas Co., California, USA

⁷From Itä-Uusima, Finland

⁴From the Trebon-Basin, Czechia

Table 2: Comparison between different populations: Angle S is the angle between the shorter pair of quadrifid glands arms, angle L is between the longer pair of quadrifid gland arms, number of teeth per ultimate leaf segment (counted without the tip).

stygia because of the form of the quadrifid glands, the ratio between the arm lengths (1.2), the number of teeth (4-7), the upwards curved rims of the corolla lower lip, and the size of the plants. Some features are different from the type description of *U. stygia*, specifically the long and narrow spurs, and long pedicels observed on these plants. However, these features are also atypical for *U. ochroleuca* s. str., and suggest an affinity to *U. intermedia*. The discovery of *U. stygia* in California extends the distribution of this species by approximately 3200 km, as the closest hitherto known collection sites are located on Richards Island, Northern Territories, Canada (N69°, W135°) and in the Kuskokwim river drainage basin, Alaska, USA (N62.5°, W154°) (Thor, 1988).

The population in Lane Co., Oregon, is *U. ochroleuca* s. lat., but is very unusual in being all green, and bearing bright yellow flowers without red or brown markings. While pure yellow flowers are also reported from Czechia (Celakovsky, 1887) and Japan (Wakabayashi, pers. comm. 2001), the plants from these populations have red pigmentation on at least the lower part of the peduncle, as is typical for the species. The spurs on the Lane Co. plants differ from the type description in being extremely short and curved.

The population in Clackamas Co., Oregon has very short inflorescences and flowers similar to *U.*

ochroleuca s. str. (cf. FloraWeb, 2001). But the number of marginal teeth on the leaf segments is extremely high (7) and the angle between the quadrifid arms is small. Therefore it is presently labeled as *U. ochroleuca* s. lat.. This site is located only approximately 80 km south of the type location of *U. occidentalis* A.Gray (1883) in Falcon Valley, Klickitat Co., Washington, USA. The collections made by Suksdorf reportedly have abnormally large inflorescences with tall scapes (10-25 cm tall), more numerous flowers (4-7) and frequently rhizoids. Thor considers this to be an aberrant population not included in his concept of *U. ochroleuca* s. str. The three USA populations of *U. ochroleuca* s. lat. discussed in this paper are very different from each other, although they are uniform within each population. It is unclear if this variability is a result of vegetative reproduction, geographic separation, or other factors. Most specimens of *U. ochroleuca* s. lat. seen show a higher number of teeth and smaller angles between the quadrifid gland arms than the sample from Finland, which is the only one at hand that is fully consistent with Thor's description. Therefore more (flowering) material from North America should be studied in greater detail⁵.

Both *U. stygia* and *U. ochroleuca* are probably of hybridogenic origin, but the observed degree of variation does not support the idea that all of them are the direct result of a recent hybridisation between the quite uniform species *U. intermedia* and *U. minor*. Unfortunately these plants are threatened and disappearing at an alarming rate—this is especially true for the southern populations (that are probably evolutionary old) in Europe, Asia, and the USA. Loss of habitat may already have resulted in the destruction of other intermediate populations that may have been useful to understand the variation within these populations. These plants are worthy of protection—it is critical they continue to exist so they can be studied to reveal if more taxa (species, subspecies or hybrids) beside *U. stygia* are to be found among *U. ochroleuca* s. lat.

Acknowledgement

Thanks to all that helped to study these rare species. J.H. Rondeau for inspiration, advice and introduction to the Californian wilderness. B. Rice for relevant contributions. G. Zizka and R. Doering (FR), M. Sonnberger (HEID), N. Lederer and T. Hogan (COLO) for allowing me to use the Herbaria. T. and H. Kessler for companionship. L. Adamec for donating living plants from the Trebon-Basin and interesting correspondence. A. Kleinstüber for information.

Material Seen

Superscript key: a=seen alive, f=saw flowers, t=saw turions, *=did not see specimens personally. Herbarium abbreviations: COLO=University of Colorado, Boulder, USA; DAV=University of California, Davis, USA; FR=Forschungsinstitut Senckenberg, Frankfurt, Germany; HEID=University of Heidelberg, Germany.

Utricularia ochroleuca:

1)^{af} Lane Co., Oregon, USA (N44°, W122°, 1470m, E.S., 6/26/2000, HEID); 2)^{af} Clackamas Co., Oregon, USA (N45°, W121°, 1160m, B.Meyers-Rice, 5/25/2001, DAV, MR010504*; J.H.Rondeau, HEID); 3) Southeast Fairbanks Co., Alaska, USA (N62°, W141°, J.H.Rondeau, HEID); 4) Park Co., Colorado, USA, (N39°, W106°, D.J.Cooper, 7/18/1991, COLO, No.448183) 4)^{at} Jihočeský Kraji, Czechia (N49°, E15°, approximately 450m, Adamec, 1989); 5)^{at} Itä-Uusima, Finland (N60°, E23°, approximately 20m, E.S., 7/26/2002, HEID); 6)^{af} North East Ostrobothnia, Finland (N66°, E29°, FR); 7) Haute Saône, France (N48°, E7°, 450m, FR); 8) Kamenz, Sachsen, Germany (N51°, E14°, HEID); 9) Swinoujskie, Poland (N54°, E14°, FR); 10)^f Lubsko, Poland (N52°, E15°, HEID).

Utricularia stygia:

1)^{af} Plumas Co., California, USA (N40°, W121°, 1650m, E.S., 6/20/2000, HEID; B.Meyers-Rice & E.Salvia 7/18/1998, DAV, MR980701*); 2)^{at} Hordaland Fylke, Norway (N61°, E6°, approximately 100m, E.S., 1996); 3)^{at} Breisgau-Hochschwarzwald, Baden-Württemberg, Germany (N48°, E8°, 850-950m, E.S., 2001; FR); 4)^{at} Weilheim-Schongau, Bayern, Germany (N48°, E11°, E.S., 2001, 590m);

⁵Out of four sterile herbarium specimens from Saguache and Park Co., Colorado, USA, only one could be confirmed being *U. ochroleuca*. (cf. Cooper, 1996)



Figure 6: *Utricularia stygia* forming turions, Black Forest, Germany, October 20, 2001

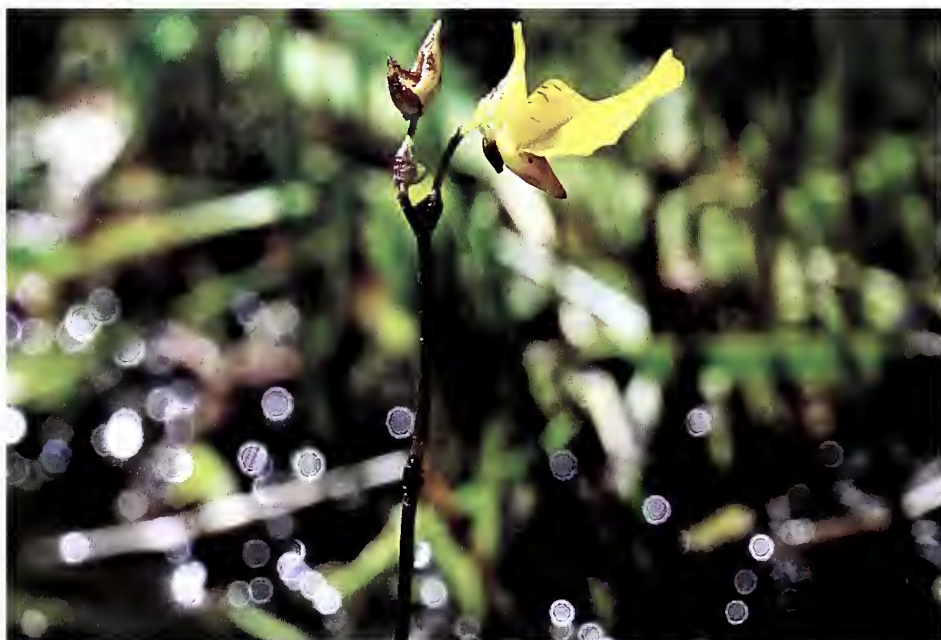


Figure 7: *Utricularia ochroleuca* s. lat., Clackamas Co., Oregon, USA, May 25, 2001. Photograph by B. Rice.

5) Garmisch-Patenkirchen, Bayern, Germany (N48°, E11°, FR); 6)^f Kaiserslautern, Rheinland-Pfalz, Germany (N50°, E8°, FR, HEID); 7)^f Ludwigshafen, Rheinland-Pfalz, Germany (N49.5°, E8.3°, approximately 110m, HEID); 8)^f Zweibrücken, Rheinland-Pfalz, Germany (N49°, E7°, HEID).

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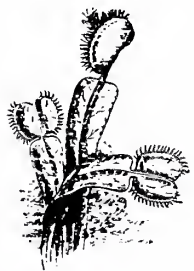
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LITERATURE REVIEWS

Casper, J. 2003, Two New *Pinguicula* Species (Lentibulariaceae) From East Cuba (Cuba Oriental). *Haussknechtia* 9: 141-155.

Pinguicula jaraguana is related to *P. albida* but differs by having oblong to spatulate leaves, subequal corolla lobes that are longer than half of the rest of the corolla, shorter corolla tube, and a thick, saccate spur. *Pinguicula infundibuliformis* is related to the variable *P. benedicta* but differs by its smaller size (up to 8 cm), infundibulate corolla tube almost lacking a distinct spur, and suborbicular leaves. (JS)

Clarke, C., Davis, T., & Tamin, R. 2003, *Nepenthes izumiae* (Nepenthaceae): A New Species from Sumatra. *Blumea* 48: 179-182.

Nepenthes izumiae combines different features of related species (appendage under lid like in *N. ovata*, cylindrical upper pitchers like *N. singalana*, broad spatulate leaf shape and epiphytic habit like *N. bongso* and *N. ovata*), but it does apparently not co-occur with any of these. The same plant has been treated as "species B" in C. Clarke's book "*Nepenthes of Sumatra & Peninsular Malaysia*" (reviewed in *Carniv. Pl. Newslett.* 31, 2001). (JS)

Conran, J.G., Lowrie, A. & Moyle-Croft, J. 2002, A revision of *Byblis* (Byblidaceae) in South-Western Australia. *Nuytsia* 15: 11-19.

Byblis lamellata is described as a new species closely related to *B. gigantea* but distinguished by its seeds that have less corrugated longitudinal ribs and by the fact that the plants may resprout from the stems (not only from the rhizomes) after fire. The two species apparently inhabit disjunct ranges in southwest Australia (*B. gigantea* being restricted to the environs of Perth, while *B. lamellata* grows further N, from Eneabba to Green Head). (JS)

Debbert, P. 2002, Einige neue *Drosera*-Arten aus Südafrika (Droseraceae). *Linzer biol. Beitr.* 34: 793-800. (in German)

Several plants from South Africa are described as new *Drosera* species. *Drosera afra* is related to *D. trinervia* and said to differ by more pronounced petioles and violet petals (both features known from *D. trinervia* as well). *Drosera coccipetala* is said to differ from *D. pauciflora* by its shorter scapes and intensely red flowers, but no differences to similar forms of *D. cistiflora* are mentioned. *Drosera liniflora* is said to differ from *D. cistiflora* by white styles and smaller ovaries. *Drosera longiscapa* is said to differ from *D. collinsiae* by elongated stems and longer scapes, but no differences to similar forms of *D. madagascariensis* (or *D. nidiformis*) are mentioned. *Drosera rubrifolia* (a possible hybrid but not treated as such in the paper) differs from *D. aliciae* by distinct petioles and only basally divided styles. *Drosera variegata* is said to differ from *D. cistiflora* by stems that are leafless in the upper two thirds (a feature known in *D. cistiflora* as well). (JS)

dos Santos Silva, T.R., & Correa A., M.D. 2002, *Drosera peruensis* (Droseraceae), a New Species from Peru. *Novon* 12: 543-545.

Drosera peruensis is apparently related to *D. chrysolepis* and *D. canporupesttris* but is distinguished from both by its obtuse leaf tips. The other features stated to be characteristic for *D. peruensis* (presence of elongated stems, leaves patent when old, distinct petioles covered by eglandular hairs, scape covered by eglandular hairs) appear to occur in *D. chrysolepis* as well. *Drosera chrysolepis* is allegedly the only other Peruvian species of *Drosera*. There is, however,

a record of *D. montana* (Gentry & Nunez 69485, MO) mentioned in Brako, L. & Zarucchi, J.L., "Catalogue of the Flowering Plants and Gymnosperms of Peru" (Missouri Bot. Garden 1993, p. 412). (JS)

Jobson, R.W., Playford, J., Cameron, K.M. & Albert, V. 2003. Molecular Phylogenies of Lentibulariaceae Inferred from Plastid rps16 Intron and trnL-F DNA Sequences: Implications for Character Evolution and Biogeography. Syst. Bot. 28: 157-171.

Gene sequence homology comparisons confirmed the monophyly of Lentibulariaceae and of its three constituent genera *Pinguicula*, *Genlisea*, and *Utricularia*. Like in all previous studies, the closest non-carnivorous relative of Lentibulariaceae remains obscure. The morphologically established subgenera and sections of *Pinguicula* are not confirmed but the low number of taxa studied (twelve) does not allow any definitive statements. Two clades within *Genlisea* are coextensive with the two subgenera, *Tayloria* and *Genlisea*, as far as the limited sample (only five species studies) allows any judgment. The sections proposed in *Utricularia* (Taylor, P., The Genus *Utricularia*, Kew, 1989) are likewise confirmed as monophyletic.

According to the phylogenetical hypothesis formulated in this paper and its predecessor (Cladistics 18:127-136, 2002), sections *Polypompholyx* and *Pleiochasia* are sister groups of each other, and the two form a clade sister to all remaining taxa in the genus *Utricularia*. This prompts an explanation of the origin of the genus involving long distance dispersal from the primary center of diversity of Lentibulariaceae (tropical America) to Australia (where neither *Pinguicula* nor *Genlisea* are known to occur). A basal position of *Polypompholyx* + *Pleiochasia* within *Utricularia* in turn would necessitate opposite long distance dispersal events in the immediate next steps of the evolution of the genus, because in both major clades of the remainder of the genus predominantly American sections (viz. *Aranella* and *Psyllosperma*/*Foliosa*/*Orchidioides*/*Iperua*, respectively) are basal. Furthermore, the close morphological similarity between *Pleiochasia* and the likewise Australian section *Australiae* is not reflected in this hypothesis.

The other systematic inferences in the paper are less controversial. *Utricularia olivacea*, classified as a member of sect. *Utricularia* by Taylor, appears to belong to a separate lineage more closely related to sect. *Vesiculina*. (JS)

Kurata, S. 2003, A New Philippine Pitcher Plant (*Nepenthes saranganiensis*), the Third Species Having a Saddle-Shaped Stem. J. Insectiv. Pl. Soc. (Japan) 54(2): 41-44; figs. on front and back covers of the same issue.

Nepenthes saranganiensis (of which no flowers are known to date) differs from its supposed closest relative, *N. alata*, by saddle-shaped leaf bases (decurrent with margins joining at the side of the stem where the leaf is attached). This feature (of perhaps debatable taxonomic significance) is likewise used to separate *N. ephippiata* from *N. lowii* and *N. northiana* from *N. mapuluensis*. (JS)

Lowrie, A. 2002, *Utricularia petertaylorii* (Lentibulariaceae), a New Species from the South-West of Western Australia. Nuytsia 14: 405-410.

Utricularia petertaylorii differs from its relatives *U. inaequalis* by leaves with rounded tips and from *U. violacea* by the entire (not lobed) corolla lower lip. (JS)

Lowrie, A. 2002, *Drosera pedicellaris* (Droseraceae), a New Species from South-West Western Australia. Nuytsia 15: 59-62.

Drosera pedicellaris is related to *D. parvula* but differs by its stipule bud that lacks a point, by more numerous bracts, longer pedicels, and lacking red petal marks. (JS)

Rivadavia F., Kondo, K., Kato, M. & Hasebe, M. 2003. Phylogeny of the Sundews., *Drosera* (Droseraceae), Based on Chloroplast *rbcL* and Nuclear 18S Ribosomal DNA Sequences. *Am. J. Bot.* 90:123-130.

This is the first comprehensive genetic study to address phylogenetic relationships within the genus *Drosera*. It confirms monophyly of the genus (except for *D. regia*, which appears more closely related to *Aldrovanda* in the tree based on *rbcL* homology) and of most lineages based on morphological similarity. *Drosera arcturi* (subgenus *Arcturia*) is sister to the remaining genus, which is essentially split into two large clades, one including most of the Australian taxa, and the second comprising subgenera *Thelocalyx* (*D. burmannii* and *D. sessilifolia*) and *Drosera* (containing most species outside Australia). In the Australian clade, *D. glanduligera* (subgenus *Coelophylla*) is sister to the remaining species, which belong to two clades, one containing subgenera *Lasiocephala* (relatives of *D. petiolaris*) and *Bryastrum* (pygmy sundews), the other containing subgenera *Phycopsis* (*D. binata*) and *Ergaleium* (cormous sundews).

Drosera hamiltonii, formerly (CPN 25:67-88, 1996) classified as a separate subgenus (*Stelogyne*), appears as a sister to *D. indica* (subgen. *Drosera* sect. *Arachnopus*). *Drosera stenopetala*, formerly classified as a member of subgen. *Arcturia*, is more closely related to *D. uniflora* (subgen. *Drosera*). Within subgenus *Drosera* several clades are apparent that also share geographical distribution patterns. There are apparently two separate clades that occur in South America. The first (relatives of *D. capillaris*) has affinities to North American, Eurasian, and neocaledonian species, and most of its representatives (except *D. hirtella*) are known from northern South America (Guayana Highland). The second (relatives of *D. montana*, most of which are endemic to Brazil) is more closely related to African species.

A very weak point in the discussion is the statement that "Droseraceae are located close to the tip of the angiosperm phylogenetic tree", which is not supported by data except fallible molecular clock estimations. Conversely, fossil evidence (*Aldrovanda* seeds from Cretaceous deposits; CPN 26:93-98, 1997) proves Droseraceae to be a comparatively old family. The wrong assumption of a young age of the family results in untenable long distance dispersal speculations.

Several systematically interesting species (*D. spatulata*, *D. intermedia*, *D. communis*, all subgen. *Drosera*, and especially the somewhat enigmatic *D. meristocaulis*, the only representative of subgen. *Meristocaulis*) have not been studied in the present analysis. They should be included in future studies. (JS)

Zamudio, S. & van Marm, J. 2003. *Pinguicula konzattii* (Lentibulariaceae), una especie nueva del estado de Oaxaca, Mexico. *Acta Bot. Mex.* 62: 15-21.

Pinguicula konzattii from the "Santiago Nuyoo Pass" is related and similar to *P. mirandae*, from which it differs by more numerous leaves (70-100 instead of 30-60) that are glandular on both surfaces (instead of adaxial surface only) in the winter rosette, less numerous leaves (4-6 instead of 6-10) with a distinct (instead of indistinct) petiole in the summer rosette, and larger flowers (18-30 mm instead of 9-17 mm) with a straight (instead of strongly bent) corolla tube. Additionally, no stolons are known from *P. konzattii*. (JS)

LOOKING BACK: CPN 25 YEARS AGO

Bill Scholl's technique for leaf cutting propagation of *Sarracenia* was described: "He removes smaller, immature leaves of *S. purpurea*, including the clasping petiole, from the parent plant and dips the petiole end in Rootone. This is then potted in sphagnum and roots begin to appear in 3-4 weeks. As we would anticipate, peeling off the clasping petiolar base and juvenility seem to be key factors."

NEWS AND VIEWS

Bob Beer (sazji@yahoo.com) writes: I haven't grown carnivorous plants for about three years and am just putting my toes back in the water. Anyway, I thought I would ask if anyone paid any special attention to the attraction *Cephalotus* has to insects. The common wisdom is that *Cephalotus* produces nectar to attract ants. I had *Cephalotus* growing successfully (well, until it croaked quite suddenly that is) back in Seattle, popping out mature pitchers etc., but it never seemed to be particularly attractive to ants. Furthermore, there never seemed to be any actual sweetness. (If you are wondering if I actually licked my *Cephalotus*—well...yeah, heh heh.)

Anyway, one day, just for a lark, I put a large carpenter ant that was happening by into the pot. It pretty much went nuts—it attacked the pitcher, biting at the ribs of the peristome, and raced into the pitcher in three seconds flat. I put some other ants on, no interest at all. I found another carpenter ant, and again it went nuts over it. So—have you noticed anything similar?



Barry Rice (barry@carnivorousplants.org) writes: Recently I had the pleasure of visiting a number of carnivorous plant sites in the coastal plain near Wilmington, North Carolina. This was only my second trip to see *Dionea* in the wild. (Non-native plantings of this plant don't count!) My guide, Frank Galloway—a native of the area—was a tremendous resource (even though he was unable to help me find good barbecue in the Wilmington area, his standards were too high). As Frank showed me a bewildering variety of color forms for this plant, I couldn't help notice one thing—the direction of twisting in the pinwheel rosettes of *Dionea* were all in the same direction (see the photos below). Not all the rosettes had a clear orientation, but all the plants that did were unambiguously twisted in the same direction. It is well known that the direction of rotation in twining, climbing plants is often fixed, but I did not recall reading about this analogous behavior for *Dionea* before. When I returned home I looked in F.E. Lloyd's book, and was not surprised to see that on page 182 the extremely observant Lloyd had already noted this, back in 1942! (He also pointed out that the trap rotation, relatively subtle in *Dionea*, is much more pronounced in *Aldrovanda*.) In any event, once you notice it, it certainly is striking!

Barry Rice (barry@carnivorousplants.org) writes: As 159 happy ICPS members are already aware, the rare *Sarracenia* distribution program announced in the March 2003 issue of Carnivorous Plant Newsletter has come to a successful conclusion. A total of 318 plants were sent to members who requested plants. A happy coincidence in numbers resulted in the ICPS having slightly more than enough plants to fill the demand, so everyone who requested a pair of plants received them. The few surplus plants were donated to botanical conservatories and gardens. Survey cards with questions about survival rate, etc., were sent with the plants, and so far the reported survival rate is 98.7% (although some plants were a little shocked). Also, many people noted that the summer shipment was poorly timed. However, this schedule was mostly determined by the annual membership cycle for the ICPS. In any event, despite the possibly rough handling and summer heat, the high survival rate gives me great satisfaction with our volunteer staff's packing and shipping job. Incidentally, since the program was frugally executed, nearly \$598 was left over after all the bills were paid. Furthermore, donations from participants added another \$601 to the program's final assets. All this money will be directed into the ICPS conservation program.

Was this program a success? Well, it certainly was a success in getting *Sarracenia alabamensis* plants from three locations (ICPS site codes AL001, AL002, and AL003) into many horticulturist's collections. (Point your web browser to the *Sarracenia* discussion forum at PetFlyTrap.com to see the ecstatic comments from many of the happy new *Sarracenia alabamensis* owners, for example!) But whether it really was a conservation success will depend upon if the recipients of the plants produce seed from their specimens and give it as gifts to other growers, or donate that seed to the seed bank. If those things start happening (and it will probably take a few years for the seeds to start appearing in the seed bank listing), I think we can say the program was a success in increasing the supply of this plant among US growers. Correspondingly, the poaching pressure on wild plants will (I hope) have a comparable decrease.

I have been asked if this plan will be repeated. Even if it appears this program was a conserva-



Figure 1: Boxing up plants. From left to right: Beth Salvia, Ernesto Sandoval, Felicity Johnson, Beth Salvia, Tom Cahill, Miles Ingwers, Gary Chan, Barry Rice. Photographs by John Brittnacher. (Many other people helped in the boxing, of course.)

tion success, it would be at least three years before a new crop of plants would be ready for distribution, so do not hold your breath. (It will also take a while for the taste of all the labor required to complete the distribution program to leave my mouth!) A repeat of the program would probably involve either *Sarracenia oreophila* or *Sarracenia jonesii* (gauging by the comments to the program, probably the former). Also, it would be better if we could include our non-USA members in the program. (Since they were excluded from it this year, perhaps they should even get preferential treatment?) I have been discussing the possibility of cooperating with The Carnivorous Plant Society (UK) to cover the European Community. Perhaps the IPS (Japan) and one of the Australian societies could also be cooperators in this, too.

It was a good project: a good idea that was a success only because of the cheerful work of all those who volunteered their time and resources. Thanks!

Barry Rice (barry@carnivorousplants.org) writes: I was exploring the world wide web recently when I discovered a web page describing something bizarre and amazing: a large horticultural planting of carnivorous plants in the shape of a peace sign! I saw that Phil Crane, proprietor for "PetFlyTrap.com" was involved, and I emailed him for more information about this "Peace Garden". He wrote back: "The Peace Garden is an awesome project that was done for Art Basel. I'm not sure if you're familiar with it or not, but it's considered one of the largest and most prestigious art openings in the world. It attracts thousands of art dealers and collectors globally into one place. This year, they had a big push for 'organic' art. We were invited with a well known artist and gallery to help assemble that peace sign in the Miami Beach Botanical Gardens. It was 25 feet in diameter and contained nearly 4,000 various carnivorous plants. We got some really good international exposure for it and have continued to get inquiries about how to do that in a private collection. So it looks like it made a great impact on people! You should see some of the photos of the organizers of Art Basel actually feeding the plants crickets. It was a HOOT! Anyway, they figure the piece had about 24,000 viewers through the week of the Art Basel project."



Figure 1. Constructing the carnivorous peace sign.

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